BULLETIN OF THE TORREY BOTANICAL CLUB.
Vol. VI, Nos. 43 & 44.] [New York, July & August, 1878.

§ 246. Some Rambling Notes on Collecting and Preserving Herbarium Specimens.

III. **Collecting Specimens.**—In the previous article the necessary outfit for herborizing was considered; in this I propose to offer a few hints on *collecting*.

Plants may be collected at any time while in flower or fruit. The writer has frequently gathered and preserved fine specimens that were put into portfolio when dripping with moisture from a rain or a heavy dew. In such case, early transferring to press and change of driers is quite necessary. The best time, however, I have found is in the morning shortly after the dew has disappeared. The plants are then fresher, and when of a sensitive nature, as are some of the Leguminosæ, the Cruciferæ and others, the leaves are less likely to curl (for later in the day, if dry and sunshiny, it will be found quite difficult to put the specimens into portfolio quick enough to prevent the leaves or petals from rolling), the corollas are generally fully expanded, and fugacious petals, like those of Helianthemums, are more likely to adhere when in press. Of course this does not apply to a few plants, as *Silene noctiflora*, and some of the *Œnotheras*, that open only at night or in cloudy weather.

Care should be taken to have the specimens of the proper size,—neither too small nor too large,—and consist of all that is necessary to make a complete botanical specimen,—flowers, fruit, leaves, stem and root when possible.

In the early part of his course the inexperienced collector is inclined to think that a small sprig containing a flower or two with a few leaves will answer all purposes as a botanical specimen, but later when he comes to identify his plant by the scanty materials he has gathered, he finds recognition quite impossible, and that the flower is only *one* of the component parts of a complete specimen, and not always the most important one. Too little attention is paid, however, even by older botanists, to the collection of the *fruit* and *roots*, the former especially, as most specimens (save those of herbs where the flowers and fruit are found together) received in exchange are wanting in this important requisite. In many genera and orders the fruit is the most distinguishing characteristic, as in the Potamogetons, the Cruciferæ, the Umbelliferæ and the Cyperaceæ, and is quite indispensable for an absolute determination of the plant in hand, while in those rather difficult genera to the young beginner, the Asters and Solidagos, and in some others, the lower leaves play an important part as scientific characters in distinguishing species. And again in others it is the root or root-stem; of the former, whether it is an annual, biennial or perennial and its various shapes; of the latter, the divers forms it assumes, as rhizoma, tuber, bulb. Consequently all these parts are important in a herbarium specimen, and each and all, when necessary should receive due consideration from the botanist when collecting.

Endeavor to obtain specimens that exhibit flowers and fruit in the same plant, and when this is not practicable, the fruit may frequently be secured from more advanced specimens at the same time.

In most cases of herbs one or the other way will be found possible. If not, fruit must be collected later, as in the case of shrubs and trees, of which generally only a branchlet with flowers, or flowers and leaves, can be gathered at first; and subsequently the fruit and mature leaves, which should be taken from the same individual as the flowers.

A specimen should be so arranged as to be no larger when pressed than can be neatly mounted on the common size of American herbarium paper, 16½ by 11½ inches. This may not be the best size of mounting paper that could have been selected for a common standard, yet inasmuch as it has been adopted by most of the leading botanists and colleges of the country for their herbariums, it would be well if all American botanists at least should conform to this standard. Its general adoption would probably facilitate exchanges and contribute to an advantageous disposal of private collections when the owners thereof have finished their botanical careers; or in other words it would probably do much to prevent at that time the breaking up and often the total waste of such private and local collections,—frequently of high intrinsic value and gathered together with care, patience, assiduity and perchance much expense, —and facilitate their incorporation with the permanent herbariums connected with our societies, schools and colleges.

Herbaceous plants not over three or four feet in height should generally be preserved entire, root and all. This can be done by bending or breaking—not entirely off—at one, two or three places. If broken twice it may be arranged something like a capital N, when put in portfolio. Very large plants will have to be divided and preserved separately; or, better still, take a convenient portion of the upper stem having leaves, flowers and fruit, with a sufficient part of the lower stem containing lower leaves, and root enough to show whether annual, biennial or perennial. Thick roots, tubers, bulbs, etc., should be pared down, but in such a manner that their original shape can be easily determined. Good typical specimens and of average size should be selected as representatives in the herbarium;—although overgrown and dwarf specimens, as well as sports and abnormal growths are of value to the physiological botanist, and if peculiarly striking should be carefully preserved. The variation *from the specific type* which many plants show opens a wide and interesting field for careful investigation and merits the thoughtful attention of every intelligent observer.

It will be found an excellent plan for the collector to keep a record of the time of flowering and fruiting of the different plants and when the best specimens may be obtained in his vicinity. This will be found of great help to him in following seasons. Seasons may vary much in regard to earliness, as for example, the fore part of the floral season of 1878 in Dutchess County was three weeks earlier than in 1877, that being perhaps an average season in this region; yet, if the collector knows the relative time of flowering or stages of growth of a group of plants the previous year, and now ascertains the time when one or more of them are in the same stage of bloom as then, he will have no difficulty in telling quite accurately

when all the rest of the group will be in flower or similar stage of growth. The time of flowering of different species in relation to each other (*Synchronism*), particularly those growing together in the same situations, is a matter that never seems to have had enough attention called to it, although well worthy of the careful study and observation of the collector. A more intimate knowledge of this subject doubtless would throw considerable light on the relation of many allied species and their varieties. The writer has kept a tabulated account of the relative time of flowering of many such groups for a number of years, and aside from its practical advantages in collecting, he has found it opens to him a field of delightful research, interest and speculation.

We will close this article with a few special directions on collecting certain plants.

As previously intimated, of *Asters* and *Solidagos* be careful to collect lower leaves as well as flowers and fruit. With *Potamogetons* the mature fruit is of first importance, both lower and floating leaves (if any) should be collected.

Carices should be always collected when the achenium matures,—just before the fruit is sufficiently ripe to fall away, and the same applies to the remainder of the Cyperaceæ, but it would be well to have of these also earlier specimens in flower.

The Grasses as a general thing should be gathered as specimens much younger than Cyperaceæ, for, when too old, the spikelets in many species break up and fall away when drying,—the specimen being worthless or badly mutilated. It is well to collect in flower, and also a short time afterwards. Young botanists often think that the head or panicle is all that is required in Sedges and Grasses, and frequently send only that portion when they wish their collections named. This is an error. The culm and leaves (of Grasses in particular) should always form a part of the specimen, and the root when not too large. In several genera the root is quite important.

The culms of most Sedges and Grasses act stubbornly when bent for arranging in portfolio or press and are not apt to stay in place. This can be easily remedied by a sharp bite with the teeth at the angles where bent. But when a number of specimens are to be held together in a little package,—as is a good way to preserve small Carices,—let the angles when bent be pressed through slits in pieces of paper, and dried in that manner. Such species as are cespitous, growing in tufts, should be so collected and preserved, if not too large, so as to show this characteristic.

The willows are diœcious, so sterile and fertile catkins will have to be secured from different bushes. Each species should be represented by four pieces, first the twigs when sterile and fertile catkins can be obtained, (when the respective bushes should be marked, and later corresponding twigs with mature leaves and stipules, and fruit from the fertile plants. These remarks on the willow are applicable to most diœcious shrubs and trees.

There are a few aquatic plants which are so soft and flimsy, as the Lemnaceæ, Potamogeton pectinatus, P. Tuckermani, and Naias gracillima, that to secure them in their proper shape they should

be placed in clear water and floated out by running under them, the paper on which they are to remain permanently,—either the regular mounting paper, or a thinner white kind, which when dry can be pasted on the common herbarium sheet.

Finally, but first in importance, as you collect and put in portfolio, be particular to write the name of each species, if known, but by all means, the locality and date of collection, with any other descriptive remarks regarded necessary, on one of the lower corners of specimen sheet. On no account neglect this important point to your subsequent regret and the impairment of the specimen. This should be written as you are putting in press or portfolio. Labels, if preferred, can be used, instead of writing on margin of specimen sheets.

§ 247. **Conomitrium Julianum.**—July 22d I had the good fortune to find an abundance of this rare and curious moss in full fruit. It was on the inside of a walled-up spring a few rods West of Mt. Carmel Station, Hamden, Connecticut. The moss grew in thick tufts, like some alga, just at the water's surface, and beneath it. It also was found lining a barrel some rods away, whither the water is conducted from the spring. Taking my gatherings home, and floating them out to mount, as one does a seaweed, I found the sides of my dish covered with hundreds of the detached capsules, just as Dr. Schimper relates to have happened with Mr. Noellner, when he collected the same plant in 1839 in Baden. Since the water in a spring or stream is drawn up a little at the margin by capillary attraction, just as in the dish I employed, it is probable that these little capsule float up to the extremest edge of the water, and that there the spores germinate and grow. I will send specimens to any persons asking for them. D. C. EATON.

§ 248. **North American Lichenography.**—In the Proceedings of the Essex Institute, Salem, Mass., of Dec. 9, 1867, the writer gave a list of publications in this country on North American Lichens. Following is a continuation of that record to the present time, with additions to the preceding period.

H. N. BOLANDER. A catalogue of the plants growing in the vicinity of San Francisco, 1870, Lichens, p. 41.

A. T. DRUMMOND. Additions to the Canadian Lichen Flora, in Canadian Naturalist, March, 1874.

W. R. GERARD. Notice of the finding of *Omphalaria pulvinata*, Nyl., in Poughkeepsie, N. Y., in TORREY BULLETIN, Dec., 1875.

E. HALL and J. WOLF. Lichens of Illinois in Bulletin No. 2 of Illinois State Laboratory of Natural History, June, 1878, p. 27.

F. W. HALL. List of Lichens within twenty miles of Yale College, in American Naturalist, March, 1877.

JOHN MACOUN. Lichens of British Columbia, in Report of the Geological Survey of Canada, 1877, p. 227.

C. H. PECK. Notices of New York Lichens, in 22d Report of the Regents of the University, 1869, pp. 37, 38, 57–69; 23d Report, 1872, pp. 33, 45; 25th Report, 1873, pp. 83, 92; 26th Report, 1874, p. 47; 27th Report, 1875, p. 83; 28th Report, 1876, pp. 38, 42.

EDWARD TUCKERMAN. Lichens of the U. S. Exploration of